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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,649	10/26/2001	Paul S. Weiss	P05396US1	6169

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EXAMINER
SAGAR, KRIPA

ART UNIT	PAPER NUMBER
1756	3

DATE MAILED: 10/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

TC-3

Office Action Summary	Application No.	Applicant(s)	
	10/032,649	WEISS ET AL.	
	Examiner	Art Unit	
	Kripa Sagar	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-70* is/are pending in the application.

4a) Of the above claim(s) *60-68* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-59,69 and 70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-70* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-59,69,70, drawn to a method, classified in class 430, subclass 296.

II. Claims 60-68, drawn to a device, classified in class 436, subclass 501.

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the process as claimed can be used to make other and materially different product such as an electronic device.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with attorney John Goodhue on 10/8/02 a provisional election was made with traverse to prosecute the invention of method (Gp.I), claims 1-59,69-70. Affirmation of this election must be made by applicant in replying to this Office action. Claims 60-68 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 8,11, 20, 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

These claims recite patterning "the at least one electron / ion" using a mask or "projection". The claims from which they depend (eg. Cl 1,6) recite patterning a surface and using an electron (/ ion) to form the pattern on the surface. There is no reference to patterning an electron (/ ion). This makes the claims vague and indefinite.

The claims 11, 21 further recite using "projection" in the patterning process. This term is not defined in the specification. The specification discusses soft lithographic techniques. Projection lithography is well known in the art and stands in contrast to proximity lithography or contact lithography. The scope of the claims is not clear.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by US Pat. 5580697 to Keana et al.

The invention discloses a method of functionalizing a layer of molecules in a defined pattern and making it amenable to react with another functional group in the patterned area or the unpatterned area or both areas. Diverse patterning techniques are claimed.

The claim recites (at least) partially covering a substrate with a layer of molecules and reacting at least one internal bond in the molecule to form a functional group.

Keana teaches that chemical modification of substrate surfaces is known in prior art and generally involves two steps (1;20 – 2; 18). The improvement includes one step modification of a surface by providing reaction-energy to the molecules on the surface of a substrate and a reactant that modifies the molecules to form a second functional group. The second functional group is receptive to other reagents (2;21 – 3;62).

Claim 1 is further rejected under 35 U.S.C. 102(b) as being anticipated by US Pat. 6114099 to Liu et al.

Liu teaches that forming functional molecular layers on a substrate with defined patterns capable of reacting with other functional groups is prior art (1;16 – 3;49). Liu's contribution includes forming uniform monolayers and multi-layers on a pre-patterned substrate (3;66 – 4;34). A first layer is formed on the partially exposed areas of a substrate and reacted with multiple functional groups (in sequence) to form a multi-layer functional group.

Claims 1, 54-59 and 69-70 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat. 6436615 to Brandow et al.

Claims 54-59, 69-70 disclose nanolithographic patterning of a molecular layer.

Brandow teaches that "surface reactivity templates" are known in prior-art (1;31-56). Brandow's invention comprises providing a functional group on a substrate surface, exposing parts of the surface to actinic radiation to convert the exposed regions to photoproducts; the photoproducts are reactive to other functional groups (1;67 – 2;25). Brandow discloses patterning of molecular layers (Fig.1-3) that include positive and negative tone patterns. In one embodiment the reaction of the first functional group forms a second functional group (Fig.2A)

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2 – 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandow in view of Keana and further in view of the non-patent publication of Nyffenegger and co-worker ("Scanning Probe Microscope", Chem. Rev. v97(4),(1997), pp.1195-1230).

The claims recite methods of forming the patterned layers using scanning probes and diverse energy sources, the substrates used as supports for the layers and the nature of the layers.

In additions to the teachings discussed above, Brandow teaches selective modification of a *surface* or a *thin film* covering the surface. The modification is a *chemical reaction* of the molecules on the surface, by *irradiation*. The process *may* include *a mask* or *direct writing* may be used. The irradiation may be carried out using *UV light*, *ion beam* or *soft X-rays*. (2;50-3;4). Other sources such as *electron beams* are also viable (4;53-61). Direct chemical reaction is also known (3;19-27). Substrates such as *glass* (fused SiO2) and *Si* have been used for support (12;29-31). Scanning Tunneling (STM) and Atomic Force Microscopy (AFM) are used for selective patterning (3;5-32). The molecular layer may be attached to the substrate surface through diverse bonds that include *chemical attachment* and physisorption (3;58-64).

Brandow does not teach the use of scanning probe tools (SPM), thermal imaging, diverse substrates and geometric patterns. It does not specify nanolithography or cross-linking of functional groups.

Keana teaches diverse *substrates* that may be used for chemical modification (2; 27-35). The molecular layers may be modified by radiation, including electrons, photons and *heat* (2;36-46). The process may use a *mask* or *direct scan* (7;7-29). The process is used to form *geometric patterns* including *stripes* and nano-scale spheres (fig.1,3). Keana teaches forming functional groups that are *cross-linkable* by photons (20;48-57).

Keana does not teach the use of scanning probes for photon irradiation. This is a well developed art as shown by the review of Nyffenegger. The lithographic application of Near Field Scanning Optical Microscopy (NSOM) is reviewed at length (p. 41).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Keana and Bottomley with those of Brandow because the Keana's teachings are in an analogous art and it teaches that its methods have wide applicability and can be carried out in a single step (2; 12-18); Bottomley teaches that scanning optical lithography using proximal probes is known in prior art and may be successfully used in patterning very thin films of conventional and unconventional resists (p.41).

Conclusion

11. The formation of monomolecular and multi layered films of functional groups is known in the art. The patterning of such films and reaction with other functional groups has been in progress for a long time and is used in a wide range of arts including, for example, biosensors. The Applicant has attempted to claim a very broad set of elements in an art that is well-developed. In so doing, the Applicant has failed to narrowly define and distinctly claim the invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427. The examiner can normally be reached on 8:00AM--5:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone numbers for

the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

MH/ks
October 17, 2002